OBSERVATIONS FROM GREENLAND

Weather observations broadcast from the recently installed radio station at Julianehaab, Greenland, are now being received regularly in Europe, and since March 19 have been published on the British Daily Weather Maps. It is expected that these observations will shortly be regularly available in the United States and Canada. The Canadian radio station at Belle Isle is under instructions to pick up these messages, and is already receiving them irregularly. Julianehaab will also later collect and transmit weather messages from the low-power radio stations at Godthaab and Godhavn, on the west coast, and Angmagssalik, on the east coast of Greenland.—*W. E. Hurd.*

551.506 (265.2)

NORTH PACIFIC OCEAN

By WILLIS EDWIN HURD

A glance at the pressures over the North Pacific Ocean for March, 1926, shows again, as in January, a considerable departure from the average. The center of the Aleutian LOW was at Dutch Harbor, with a pressure of 29.27 inches, almost a half inch below the normal. The crest of the anticyclone lay a few hundred miles southwest of the Washington coast. At Tatoosh Island the monthly pressure of 30.15, was 0.17 inch above the average. Hence the normal March gradient of 0.24 inch between Dutch Harbor and Tatoosh Island increased this month to 0.95 inch, thus establishing an extraordinary gradient for the time of year.

The following pressure table gives data for several land stations:

TABLE 1.—*Averages, departures, and extremes of atmospheric pressure at sea level at indicated hours, North Pacific Ocean, March, 1926*

Station	Average pressure	Departure from normal	Highest	Date	Lowest	Date
	Inches	*Inch*	*Inches*		*Inches*	
Dutch Harbor [1]	29.20	−0.47	30.07	12th	27.98	18th.
St. Paul [1]	29.45	−0.30	30.16	do.	28.44	do.
Kodiak [1]	29.52	−0.23	30.22	30th	28.56	19th.
Midway Island [1]	30.06	−0.02	30.24	11th	29.80	1st.
Honolulu [2]	30.07	+0.03	30.23	7th	29.85	31st.
Juneau [2]	29.99	+0.05	30.52	23d	29.12	21st.
Tatoosh Island [2 3]	30.15	+0.17	30.45	22d	29.68	30th.
San Francisco [2 3]	30.03	−0.02	30.38	11th	29.68	24th.
San Diego [2 3]	30.00	−0.02	30.30	do.	29.74	do.

[1] P. m. observations only.
[2] A. m. and p. m. observations.
[3] Corrected to 24-hour mean.

NOTE.—Correction indicates telegraphed pressure readings for February, 1926, at Dutch Harbor, were too low. Average should be 29.25 instead of 29.20.

In connection with the active cyclonic circulation which continued over the greater part of the northern half of the ocean, gales and heavy snow squalls were frequent. The American steamer *West Hixton*, en route from Oregon toward Japan, reported snow squalls daily west of longitude 160° W., from the 1st to the 13th of March, when she arrived at her destination. More snow seems to have fallen along the northern steamship routes over the western two-thirds of the ocean than during any of the three previous months. On the contrary, over the eastern part of the Gulf of Alaska, probably less snow fell than usual. At Juneau, while precipitation was much more than the average, the total snowfall, 0.1 inch, was the least ever known for the month. This March was the second warmest on record at Juneau, and was the warmest of record at various places along the American coast, including San Francisco and San Diego. The month was also warmer than the average at Honolulu.

Observations indicated few gales along the north American coastline. These include some moderate northeasters over and southwest of the Gulf of Tehuantepec, and the few gales reported by steamships off British Columbia. West of 140° W. gales were frequent to 170° E., but between there and the Japanese coast, from 30° to 50° N., they occurred on a greater number of days than elsewhere.

Two storms of considerable violence appeared upon the maps. On March 10 and 11 a cyclone emerged from Japan, accompanied by heavy snow and whole to hurricane gales east of Hokkaido, and lesser gales as far south as the Ogasawara Islands. As the storm moved eastward, near-hurricane winds accompanied it until the 13th. On that date gales of force 11 occurred over a considerable region south of Kamchatka. After the 13th the energy of the disturbance abated. Meanwhile, over the west-central Aleutians, there gathered one of the fluctuating centers of the Aleutian LOW. The progressive cyclone joined forces with it near the one hundred and eightieth meridian and 50° N., on the 17th, and from this merger there developed a vast low pressure area between Japan and British Columbia, at the center of which, Dutch Harbor, the pressure on the morning of the 18th had diminished to 27.98 inches. This was more than 2 inches lower than the pressure readings at that time at both Vancouver and the Hawaiian Islands. Singularly enough, despite the gradient, on that day there were no reports of gales exceeding force 9 on the ocean, but on the 19th near-hurricane winds were encountered in the neighborhood of 48° N., 155° W. The progressive movement of the storm continued, and the center entered the British northwest on the 21st.

The second important storm was in the process of development on the 26th as a secondary to the LOW then central over the Aleutians, but it was not until the following day, at which time it was central near 35° N., 150° W., that it acquired much energy. On the 28th and 29th it attained considerable violence in its northwestern quadrant, where gales of force 11 were experienced by steamers bound to or from the Hawaiian Islands. The storm took a rather extraordinary southward course, being central on the 29th at about 27° N., 152° W. On the 30th, in 25° N., it lost most of its energy, though it continued as a depression east to northeast of Hawaii until the end of the month.

The prevailing wind at Honolulu, as during many months past, was from the east, though the maximum wind velocity, 34 miles per hour, was from the southwest, during the formation of the cyclone to the northward on the 26th. March was the fifth consecutive month here with deficient precipitation, and the eighth with excess temperature.

Fog was observed less frequently than for several months past along our coast. There was little change in the frequency of its occurrence otherwise since February over the eastern part of the ocean. It was reported on the greatest number of days, principally during the last decade, near 50° N., 140° W. Reports of fog were infrequent from east longitudes, and it seems to have been confined largely to coastal waters east of Japan and between Hongkong and Shanghai.

An ice field about 5 miles in diameter was reported on the 10th, in 43° 04′ N., 146° 28′ E., and was also observed in the neighborhood on several other dates.

NOTES

By John Preller, second officer American steamer *Tejon*, San Pedro to Balboa.—"March 28, 3 p. m., local time. In latitude 16° 56′ N., longitude 100° 36′ W., noted a mirage. The steamship *Empress of Scotland* passed about 5′ to the southward, and at times she appeared as if cut in two, her center disappearing, while at other times bow and stern were lost and only the middle showing. Sea smooth at the time. Sky clear. Variable winds during the day boxing the compass."

By W. H. Walker, master of the American steamer *Eelbeck*, Panama to Honolulu.—"On the passage of the American steamship *Eelbeck* from Panama Canal to Honolulu, on the great circle track, there was a complete absence of the northeast trade winds; the vessel passing through light variable winds and calms for 16 days. On the 28th of March, however, when in longitude 143° West, the ship met with strong winds from the southward, accompanied by a rough sea and heavy rain. This lasted for 15 hours, shifting to the west and northwest, bringing up a high head sea which continued to retard the vessel's progress until reaching the vicinity of the islands, when the sea moderated. This unusual weather delayed the ship 24 hours."

—*W. E. H.*

551.506 (73)

DETAILS OF THE WEATHER IN THE UNITED STATES

GENERAL CONDITIONS

During the first half of the month the movement of cyclonic storms was mostly along the northern border but toward the end several rather intense storms developed in the far Southwest and moving across the central valleys passed off to sea. During the passage of one of these storms heavy snow fell over the southern Great Plains regions—Kansas to Texas. Another feature common to all of the months of 1926 was the great increase in energy of the cyclonic storms when reaching the Canadian Maritime Provinces and adjacent oceanic ares.

Temperature east of the Rocky Mountains, except over Montana and the Dakotas, was below normal several degrees as shown on Chart III; it was above normal by the same amount west of the Rockies. The usual details follow.—*A. J. H.*

CYCLONES AND ANTICYCLONES

By W. P. DAY

The first 12 days of the month were marked by generally high pressure over Canada and an accompanying succession of high-pressure areas from this region spreading southward over the United States. Five of the seven Alberta HIGHS were charted during this period. During the remainder of the month the HIGHS were more varied with respect to place of origin. The HIGH which appeared in the Northwest about the 25th was a combination of Alberta and North Pacific types.

Eighteen LOWS were plotted, several of which were quite important as storms. Of the latter, four were of the Texas type, i. e., secondaries developing over northeastern Mexico and southern Texas.

FREE-AIR SUMMARY

By V. E. JAKL

The free-air temperature departures at all aerological stations were negative (see Table 1) and as a rule increased somewhat with altitude. This departure aloft extended to some portions of the country where surface temperatures were above normal, as over North Dakota, where Chart III, this REVIEW, shows that it was warmer than normal. Over Ellendale a change to a negative departure took place at no great elevation above the ground, the average departure increasing with altitude to −3° C. at 4,000 meters. The greatest departure was at Royal Center, in the general vicinity of which the surface negative departure, as shown on Chart III, was also greatest. Relative humidities showed no important departure at any station.

Free-air winds were of more northerly component and greater velocity than normal, the general directions having been about northwest over middle sections of the country and more nearly west over eastern sections (see Table 2). Except at San Francisco, winds having a decided easterly component to high altitudes were almost absent, even over the most southerly stations. At San Francisco they were observed on 10 days scattered throughout the month. An exception is also noted at Ithaca, where a northeasterly wind was observed on the 21st to 10,000 meters.

Examples of wind velocity increasing rapidly with altitude as surface friction is surmounted are very common. However, instances of rapid increase are also occasionally observed that obviously can not be thus accounted for, as at Broken Arrow on the 2d. This observation showed a stratum of light northeasterly wind extending 800 meters above the ground, at the top of which the velocity fell to 1 meter per second. Immediately above this stratum, the wind changed abruptly to westerly and increased in velocity to 18 meters per second at 1,300 meters and to 32 meters per second in the next 3,000 meters. A somewhat similar condition is noted in the record of the afternoon two-theodolite pilot balloon observation at Groesbeck on the 26th, where a northeasterly wind extended with diminishing velocity to 2,000 meters, above which an abrupt change to southwesterly occurred, with rapid increase in velocity from 1 meter per second at 2,000 meters to 27 meters per second at 4,100 meters. In both cases a higher sea level pressure is found to the north or northeast of the station, which accounts for the northeasterly winds in the lower levels, and a general pressure and temperature situation over the country as a whole to account for the strong westerly winds in the upper levels, with evidently a sharp line of discontinuity intervening. Where an abrupt change in direction with altitude occurs, under ordinary conditions of fair weather, the velocities in the transition stratum are always very light.

An indication that surface friction over a not very rough terrain is ineffectual in causing turbulence to any perceptible height when the temperature is rising aloft is shown by the record at Drexel on the morning of the 17th, when a steady southerly surface wind of from 8 to 10 meters per second increased to 30 meters per second from the southwest 400 meters above the ground. The surface and aerological observations indicate that at the time of morning surface minimum temperature (−1.1° C.) the temperature increased steadily with altitude to 16.4° at 400 meters. As soon as insolation began the surface temperature rose rapidly to a maximum of 23.3° C. in 8 hours. If, before insolation began, turbulence had extended to any considerable height, a positive lapse rate would have been observed within that height.

The kite flights at Royal Center on the 16th and 17th show a change to higher free-air temperatures from one day to the next, the station on the first day being in front of a LOW and on the second under relatively higher pressure in the rear of a HIGH. A similar temperature change is noted in the Washington Naval Air Station airplane records of the 5th and 6th, where the change was